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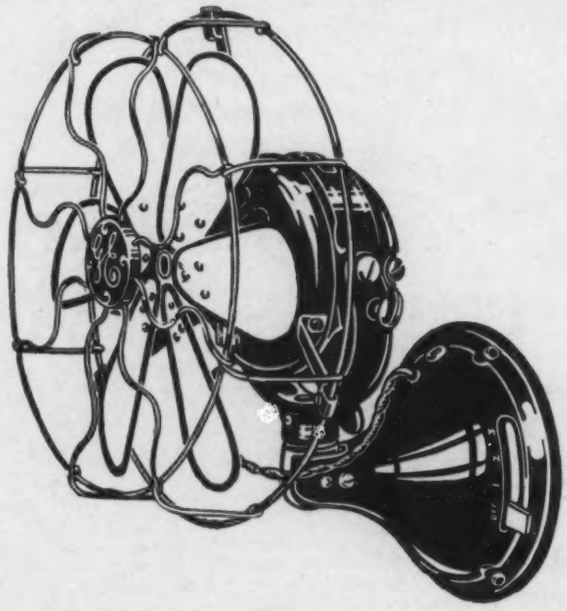

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ELEMENTS OF FUEL OIL PRACTICE AND BOILER TESTING

BY ROBERT SIBLEY.

(This is the first of a series of articles which in their entirety will constitute a complete treatise on steam power plant practice. The author is Professor of Mechanical Engineering at University of California.—The Editors.)

The Modern Power Plant and the Reason for Its Existence.

The enormous growth of the electrical industry throughout the world during the past decade has entirely revolutionized methods of power development. Especially is this true west of the Rocky Mountains where gigantic natural water powers have been put to a useful purpose. Owing to the fact, however, that most of the western streams show a great variation in flow, in the different seasons of to depend solely upon water power the year, it is not always possible for the supply of electrical energy. In recent years the advent of crude petroleum upon the Pacific Coast, representing a total in production of 98,000,000 barrels during the year 1913, has made it possible when rainfall or water supply is lacking to cheaply supply the needed power. During certain hours of the day, too, when the so-called peak load conditions are to be met by a central station, additional powers over that possible to supply from the hydroelectric station are found to be necessary. Hence the steam power plant, consisting of large concentrated units, is now recognized as an indispensable auxiliary to continuity of service.

In order that there should be no excessive loss in distribution, these concentrated steam power units are usually found in the heart of the great distribution centers. Especially is this true where abundance of circulating or cooling water may be obtained. Thus we find in central California, Station A and Station C of the Pacific Gas & Electric Company, and the Fruitvale station of the Southern Pacific Company all situated in the distributing centers of San Francisco and its immediate vicinity. In Los Angeles we find that the Redondo plant of the Pacific Light & Power Corporation and the Long Beach plant of the Southern California Edison Company, owing to the lack of

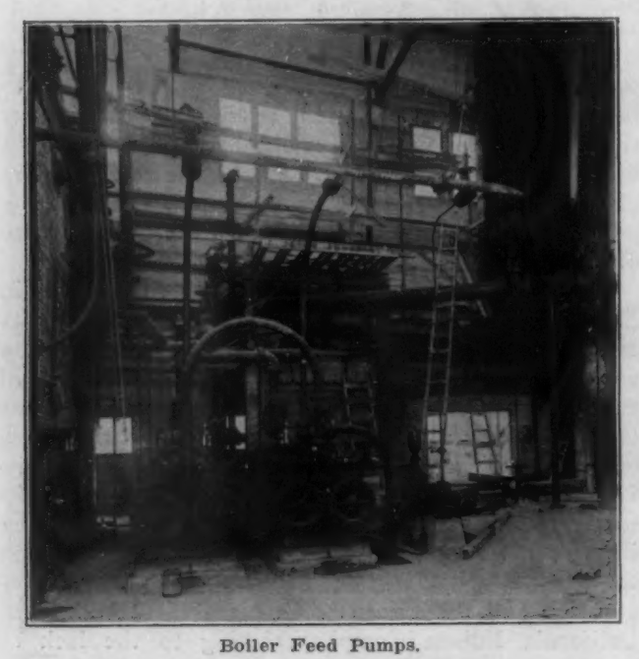
Interior of a Modern Horizontal Steam Turbine-Driven Electric Power Plant.

abundant cooling water near the distribution center, are situated at a distance from it of some fifteen or twenty miles.

General Description of the Modern Power Plant.

It will now be interesting and instructive to examine the details of a typical power installation of the sort just hinted at.

First, we shall describe the so-called steam cycle, or the journey of the steam making water from the time it enters the steam boiler until it has completed its journey through the turbine, or power unit, and returned again to the boiler; secondly, we shall consider the circulating water which is necessary in large quantities to convert the exhaust steam back again into water; and thirdly, we shall touch briefly upon the journey of the oil from the time it leaves the cars at the sidetrack until it disappears from the chimney



Boiler Feed Pumps.

as a flue gas. We shall touch briefly upon the general size and functions of apparatus employed to accomplish these results.

Steam Cycle.

Storage Tank. The supply of water for steaming purposes is usually brought to a make-up or storage tank from supply wells either on the immediate premises or nearby property. If these are not found, it is brought from rivers, lakes, or other bodies in the vicinity, or in many cases is purchased from some water company supplying the municipality. The storage tanks are varied in size, shape and capacity from a small tank, used as a receiver and hot-well, to a number of tanks, large and small, used for storage purposes only.

The use of storage tanks depends upon the source and quantity of water supplied and the load carried by the plant. Where there is a steady and positive source of supply, the tank may be of small capacity. In some cases where the supply is small and the storage at different periods is unfit for use, larger storage and settling tanks are required, and at times even filtration and cleaning tanks also are employed.

Pumps for Storage Supply. The tanks above alluded to, are filled either by pumps, gravitation flow, syphons, or piping from a water company's main. There seems to be no standard type of pump. Both reciprocating and rotary appear in standard practice. On the other hand, many plants have wells, and water is lifted by air pressure. This, on account of the total absence of working parts, is particularly useful where there are a number of scattered wells, and, also, when it becomes necessary to handle dirty water, that is, water containing sand, grit and dirt in suspension. This air lift consists of a partially submerged water pipe and an air supply pipe. The casing of the well is driven below the lift pipe. The lift pipe is set in the well either with air surrounding it between the pipe and the casing or with a cap over the casing, thus making the space in the casing air-tight. In some instances the well casing is used directly as the lift pipe.

The Hot-Well. The water from the storage tanks is either pumped or is caused to flow by gravity to a so-called hot-well. The hot-well is a tank which stores the water before it passes to the feed-water heater. It receives water from the condenser and admits an additional supply from the storage tanks to meet the needs of steam generation.

Feed-Water Pumps. From the hot-well, water is taken through feed-water pumps into the feed-water heater. The function of a feed-water heater is to heat the entering water to a temperature approximating that of evaporating conditions in order to keep the boiler at as even a temperature as possible and at the same time to put the exhaust steam from the auxiliary apparatus to some useful purpose.

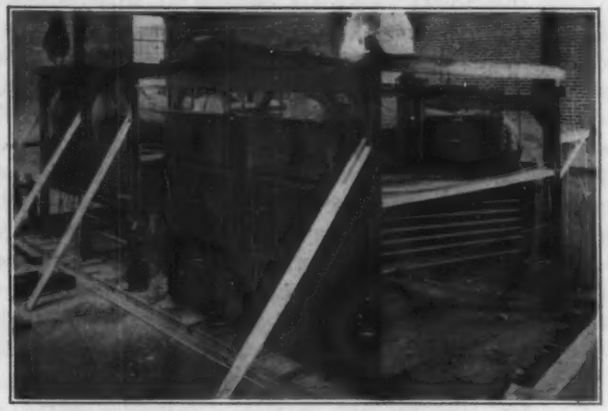
Feed-water heaters are divided into two general types: open and closed. In the open heater the steam comes in direct contact with the cooling water, and if there is a sufficient quantity of steam, it raises the water to 212 degrees F., the excess steam passing to the atmosphere. In a closed heater, on the other hand, the water is not exposed to the air and, if necessary, can be raised to boiler temperature. The water from a closed heater is as a rule much cleaner, since at high temperatures the deposits and minerals in solution are precipitated.

In steam plants where closed feed-water heaters are used, the boiler feed pumps are placed before the heater, thus pumping through the heater to the boiler. When open feed-water heaters are used, however, the boiler feed pumps are placed between the heater and the boiler.

Economizers. Economizers are sometimes installed in place of feed-water heaters. The economizer is a series of pipes through which the feed-water passes, placed in the path of escaping gases from the boiler furnace.

The Boiler. The boiler next receives the water from these heaters and converts it into steam at the desired pressure and temperature. The main types of boilers are water and fire tube. Modern practice indicates a decided preference for water tube boilers. A water tube boiler consists of steam and water drums placed on the top and a mud drum placed below, the two being connected by a series of tubes filled with

water or steam. The fire is below these tubes, and the heat from the furnace is made to pass around



Boilers in Course of Erection Showing Water Tubes.

them several times by means of headers or partitions, thus supplying heat for steam generation.

The Superheater. The water being thus converted into saturated steam by heat from the furnace of the boiler, is next passed through a series of tubes known as a superheater. These tubes are ex-

A Typical Arrangement of Boiler Installations.

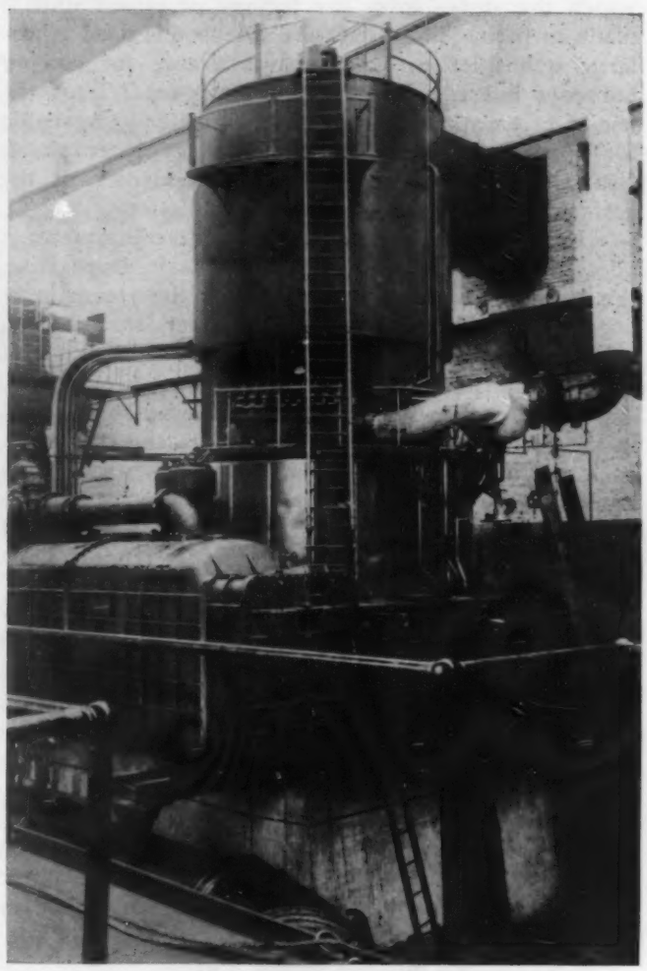
posed in a heated portion of the furnace and thus the steam is raised to a point much higher than its saturated temperature.

The Separator. From the superheater the steam passes through suitable piping to a separator, placed between the boiler and the engine, or between the boiler and the turbine. This separator is placed as near the power unit as possible in order to remove all condensed steam that may be found in the pipes. One form of separator performs its function by quickly reversing the direction of the flow of steam, thus depositing the water into a drip which is drained off into the condenser. Another form gives a rotary motion to the entering steam thus hurling particles of water off by centrifugal force and collecting in proper receptacles. Again baffle plates are at times employed wherein the flow is interrupted by corrugated or fluted plates, and the particles of water adhering to these, are then drained off.

Reciprocating Engine or Steam Turbines. The steam next goes from the separator to the main power generating units. The main units in earlier practice were reciprocating engines, in modern installations they are steam turbines.

Reciprocating engines may be divided into several classes, the details of which will not be outlined in this general discussion. Suffice it to say, however, that the main principle upon which reciprocating engines act is that steam enters a cylinder under pressure, thus forcing ahead a piston which is connected to a crank arm, thereby causing rotation and the consequent generation of power.

Steam turbines are divided into two general classes known as impulse turbines and pressure turbines. In the impulse turbine steam is allowed to expand in passing through a nozzle, thus causing the steam to travel at an enormous velocity. The steam, having



Vertical Type Steam Turbine With Condenser Base.

acquired this velocity by impinging against movable blades, causes rotation and the consequent generation of power. In the pressure turbine, however, the steam is allowed to enter the buckets or rotating vanes at a comparatively low pressure. These vanes are so designed that the steam may expand in this movable portion and by means of its expanding pressure cause rotation and hence the generation of power.

Turbines as a general rule have two other classifications known as vertical and horizontal. The vertical turbine revolves upon a vertical shaft, which is supported at the bottom by a thin film of oil under

the high pressure of about 900 to 1000 lb. per in. The horizontal turbine, however, as the name indicates, rotates on a horizontal axis, and is supported in the usual manner, by means of suitable bearings.

Condenser. From the steam turbine, the steam, having expanded to its useful limit, is dropped into an incasement through which cold water is being passed. Upon coming in contact with this cooling device the steam is again converted into water. The apparatus performing this function is known as a condenser, there being two general classes, surface condensers and jet condensers.

In the surface condenser the steam from the turbine and the cooling water from a nearby source of supply, do not come into direct contact, but the cooling water is passed through inclosed tubes around which the steam from the turbine or power unit is made to pass. This type of condenser is used where large quantities of water are available for cooling purposes but not for steaming purposes. Thus the use of salt water, the only abundant supply available for ocean-going steamships and large power plants situated near the ocean, makes a condenser of the surface type imperative for such installations.

In the jet condenser the supply of cooling water is allowed to mingle with the steam as it drops from the turbine or power unit and thus the steam is at once condensed into water. The water from the jet, being pure in supply, may be used in the hot-well for steam purposes.

Wet Vacuum Pumps. The condensed steam, now in the form of water, is pumped from the condenser back again into the hot-well by means of what is known as the wet vacuum pump. This pump may be either a reciprocating or rotary pump, but in general the rotary type seems to have the preference. Thus the entire cycle for the water is traced from the make-up tank or hot-well through the boiler and power unit, and back again to the hot-well.

Dry Vacuum Pumps. The condenser also has a dry vacuum pump in order to remove from the steam space within, any air which may have been trapped from the steam generated in the boiler. This pump is nothing more or less than an ordinary air compressor so designed that it will take air at a very low pressure and compress it up to ordinary atmospheric pressure, thus pumping, as it were, into the outer atmosphere such air as may have been entrapped in the condenser.

Circulating Water Cycle.

The description of the working of the condenser has shown that cooling water is necessary to convert the steam in the condenser back again into water. This cooling supply is known as circulating water, which is usually taken from some large natural lake or river or even the ocean through pipes, and forced by means of reciprocating or rotary pumps through the condenser and then back again into the open. The water in its journey is raised in temperature in the surface condenser system from 25 to 30 degrees F. above its entering condition.

The Oil Cycle.

Of general interest to boiler testing and operation is the oil cycle employed in the utilization of crude petroleum as a fuel. Let us then briefly trace the journey the oil makes through the modern power plant.

In the larger installations the oil is sidetracked from the main railway line in specially designed cars for its easy conveyance and handling. An oil heater, consisting of a coil through which steam is passing, is lowered into the car in order to warm the oil as it is drawn, thus making its transfer considerably easier. By means of a pump this oil is then taken into a storage tank which may be of wood, steel, or concrete, depending upon the permanence of design thought necessary. From this storage tank the oil is pumped through oil heaters, the exhaust from the pumps in many cases being utilized in still further heating the oil before it reaches the burner or atomizer.

An atomizer is a device used to vaporize or spray the oil into the furnace in fine globules or particles. This is either accomplished by means of steam, air, or some mechanical contrivance. Immediately upon its being sprayed into the furnace carefully designed air regulating devices admit sufficient air from below to cause perfect combustion. The heat thus liberated from the oil, due to its burning with the oxygen, is caused to flow in and around numerous tubes through which water is passing, and thus this water is converted into steam. After passing these tubes the heated flue gases brought to life by the burning of the oil with the entering air are then conducted through the chimney out into the atmosphere.

General Summary.

Thus it is seen in this brief description that by using crude oil as fuel three main cycles of operation are synchronously carried on in the modern power plant. Briefly summarizing, these are as follows:

Water is taken through the boiler, converted into steam and passed through a driving mechanism, after which the steam is re-converted into water and this water again passed through the boiler. Simultaneously with this action water is being pumped through the circulating system to bring about the conversion of the steam from the power unit into water. Again oil in a finely atomized or gaseous state is being fed through pipes into the furnace, where it immediately combines with the proper quantity of oxygen from the entering air, and thus sufficient heat is liberated from the oil to evaporate the water supply of the boiler into steam or power generation.

[To be continued.]

The electrical distillation of turpentine is an established industry at False Creek, Vancouver, B. C. This is one of the lesser known uses to which electrical energy can be put, but is one advantageous to central station and consumer. The Douglas fir there used contains a large quantity of turpentine and with waste from the mills in abundance, and comparatively low rates for energy, profitable results have been obtained. In addition to the turpentine extracted, the by-products such as charcoal, resin, wood tar, and tar oil, also add to the profits. The average yield from each ton of wood treated is approximately 13.5 gal. turpentine; 650 lb. charcoal; 335 lb. resin; 135 lb. wood tar; and 10 gal. tar oil.

OREGON ELECTRIC RAILWAY STATISTICS.

Preliminary figures of the forthcoming quinquennial report on the electric railways of the state of Oregon have been given out by Director W. J. Harris of the Bureau of the Census, Department of Commerce. They were prepared under the supervision of W. M. Steuart, chief statistician for manufactures.

The statistics relate to the years ending December 31 for 1912 and 1907, and June 30 for 1902. The totals include electric light plants operated in connection with electric railways and not separable therefrom, but do not include reports of mixed steam and electric railroads nor railways under construction during the census year which had not begun operations.

The figures as presented for the state of Oregon show substantial gains for the decade 1902-1912. The number of operating companies—six—remained the same. There were 545 miles of track in 1912 as compared with 137 miles in 1902, or an increase of 299 per cent. The persons employed numbered 3,041 in 1912 as compared with 525 in 1902, or an increase of 479 per cent. The revenue passengers carried numbered 75,842,324 in 1912 as compared with 18,729,442 in 1902, or an increase of 305 per cent. The gross income in 1912 amounted to $7,856,471 as compared with $1,042,895 in 1902, or an increase of 653 per cent. The operating expenses in 1912 amounted to $3,736,259 as compared with $653,912 in 1902, or an increase of 471 per cent. The total horsepower developed was 109,450 in 1912 as compared with 4250 in 1902, or an increase of 2475 per cent.

The figures are shown in detail in the accompanying table:

	Oregon.			Per cent of increase: 1902-1912.
	1912.	1907.	1902.	
Number of companies (all operating)	6	8	6	.....
Miles of line	389.11	169.28	94.40	312.2
Miles of single track	544.64	253.41	136.67	298.5
Miles of single track in state[1]	567.48	259.02	136.67	315.2
Cars, number	1,400	670	279	401.8
Passenger	722	466	250	188.8
All other	678	204	29	2,237.9
Electric locomotives	22	7	....	.....
Persons employed	3,041	1,216	525	479.2
Salaried employes	698	93	35	1,894.3
Wage earners (average number	[2]2,343	1,123	490	378.2
Power:				
Horsepower	109,450	.....	4,250	2,475.2
Kw. capacity of dynamos	38,740	80	3,294	1,076.1
Output of stations, kw.-hr.[3]	169,609,004	73,000	7,144,692	2,273.9
Current purchased, kw.-hr.	12,937,739	(4)	(4)	.....
Passengers carried	101,194,338	63,930,947	23,666,753	327.6
Revenue	75,842,324	49,459,483	18,729,442	304.9
Transfer	21,916,726	12,146,734	4,937,311	343.9
Free	3,435,288	2,324,730	(4)	.....
Car mileage (passenger, express, freight, etc.)	19,509,670	15,025,037	4,781,105	308.1
Condensed income account:				
Gross income	$7,856,471	$3,627,990	$1,042,895	653.3
Operating expenses	$3,736,259	$1,638,271	$653,912	471.4
Gross income less operating expenses	$4,120,212	$1,989,719	$388,983	959.2
Deductions from income (taxes and fixed charges)	$3,050,248	$992,748	$146,519	1,981.8
Net income	$1,069,964	$996,971	$242,464	341.3

[1] Including track in state owned by outside companies.

[2] Number employed Sept. 16, 1912.

[3] The decrease in power and output of stations in 1907 as compared with 1902 and the increase in 1912 as compared with 1907 are due to changes in the organization of electric station and electric railway interests. In 1912 the central electric stations and electric railways combined reported a total output of 228,398,346 kw.-hr. as compared with 92,880,992 kw.-hr. in 1907 and 24,676,352 kw.-hr. in 1902.

[4] Figures not available.

STANDARD SPECIFICATIONS FOR POLES.

Western Red Cedar.

The following are the revised official specifications of the Western Red Cedar Association covering standard telephone, telegraph and electrical distribution system poles in sizes of 4 in. 20 ft., and upwards:

All poles must be cut from live, growing cedar timber, peeled, knots trimmed close, butts and tops sawed square, tops must be sound and must measure as follows in circumference:

Poles.

Top.	Circum.
4 in.	12 in.
5 in.	15 in.
6 in.	18½ in.
7 in.	22 in.
8 in.	25 in.
9 in.	28 in.
10 in.	31 in.

Crook.

No pole shall have more than one crook, and this shall be one way only, the sweep not to exceed one inch to every six feet in length. Same to be determined in the following manner: Measurement for sweep shall be taken as follows: That part of the pole when in the ground (six feet) not being taken into account in arriving at sweep, tightly stretch a tape line on the side of the pole where the sweep is greatest, from a point six feet from butt to the upper surface at top, and having so done, measure widest point from tape to surface of pole, and if, for illustration, upon a 30 ft. pole said widest point does not exceed five inches, said pole comes within the meaning of these specifications.

Butt Rot.

Butt rot in center, including small ring rot, shall not exceed 10 per cent of the area of the butt. Butt rot of a character which impairs the strength of the pole above the ground is a defect.

Knots.

Large knots, if sound and trimmed smooth, are not a defect.

Dead or Dry Streaks.

A perfectly sound, dead or dry streak shall not be considered a defect when it does not materially impair the strength of the pole.

A basic system of rate making at once simple and comprehensive, would be welcome alike by central station managers, salesmen and others. It should be easily understandable by the customer and might be expressed in a simple formula such as for example,

$$D = \frac{L}{C^2}\ bmnaev\sqrt[a]{ablg}$$

where D is the rate in dollars, L the actual load, C the load connected, and so forth. This would cover all conditions, give a ready means for a rough (?) check to be made each month by the customer, and would thus prevent fraud and relieve the public service commission of a present excessive burden. This is proposed, with apologies, as an amendment to suggestions made by an English correspondent.

PUBLIC POLICY OF PUBLIC UTILITY CORPORATIONS

BY S. WALDO COLEMAN.

"Do unto others as you would they should do unto you, but do it first."—David Harum

(The author, with interspersed business philosophy, states clearly the situation and relationship between the public utility and the public it would serve, and proposes in the interests of all a policy of educational publicity. Mr. Coleman is president and general manager of the Coast Counties Gas & Electric Company, Santa Cruz, Cal.—The Editors.)

Have you noticed how a cheerful man carries an atmosphere of joy and cheerfulness wherever he goes?

How his own cheerfulness becomes so infectious that, in turn, it makes others about him cheerful. It is equally true with frankness, fairness and mutual understanding. It should be axiomatic that to receive frankness, it is only necessary to be frank; to be treated fairly, it is only necessary to be fair; and to be sympathetically understood, it is only necessary to first sympathize with others. We do not presume to make such an absurd statement as to claim that these suggested axioms are true at present, but we do claim and insist that these axioms are ultimately possible, provided that we truthfully apply the Golden Rule of David Harum—"Do unto others as you would they should do unto you, but do it first."

Public Utility a Tenant.

Herbert Spencer, in his "First Principles," states that before delving into the Unknowable, it is best to start well within the Knowable. Likewise, before deciding on a policy for a public utility company to pursue in its dealings with the public, it is well to first decide on our interpretation of what a public utility is. A public utility is a person, firm or corporation engaged in the business of supplying a utility to the public in a manner requiring the use of certain property of the public. The manner of the use of this property (belonging to the public) is stated more or less definitely in the grant, either in the form of a constitutional right, or a franchise right, but is always subject to the general power of regulation. In fact, outside of the power of confiscation, the state has reserved to herself complete power over all utilities, and a person operating or investing in a utility should realize this. As a utility uses the property, subject to practically any order of the public, it is acting but as the tenant of the public and as such a tenant it is evident that our first duty is an accounting of our stewardship. Practically no head of a utility corporation can truthfully say that his company has given the public all the information which he (as an owner) would want to have from a tenant; and a public utility is nothing more than a tenant serving its master (the public) under a contract (franchise).

Case of the New York, New Haven & Hartford.

Take the case of the New York, New Haven & Hartford, a railroad with tens of thousands of stockholders, and a very part of the life of New England. How much did the stockholders, not to mention the public, know about the wild extravagances and increased fixed charges added in a vain attempt to completely monopolize the transportation business of New England? Nothing, until the terrific accidents and loss of life resulting from such wild management awoke the people to a realization of the truth. How can you expect the public to be frank with the public utilities when, in the past, not even the stockholders have been generally dealt with frankly. One of the greatest fields for the improvement in the relationship of the public and the public utility, lays in more frankness, openness, on the part of the utility. If a utility has done right, it should not fear publicity. If it has been guilty of dishonesty, etc., the permanent development of the public utility business is advanced by its just condemnation. The way to educate the public to be frank with us, is to first be frank with them.

Abuses by the Public.

Due largely to the fact that utility corporations representing an aggregation of capital, have generally been so secretive in their business, failing to give an accounting of their stewardship, there has become a world-wide tendency to hamper such corporations, and unfortunately the public has not differentiated between the corporations honestly and fairly conducting business, and those that are not. It has resulted in making it difficult for public utilities to obtain the money needed to make necessary improvements and extensions which would not only be of benefit to the companies and their customers, but also to the cities served by the companies. As is well known, baiting of public utility corporations has been common practice among some politicians.

Public utility corporations can overcome this by candid publicity, but the public are human and will not take the time or trouble to find out what our just equities are unless they are shown them. Some will say that the public are suspicious, always looking for the "nigger in the wood pile," so to speak. Well, why shouldn't they? We do not accuse corporations of downright falsehoods so much as of the crime of telling only half the truth. Take the ordinary earning reports of public utility corporations; how many of them show depreciation?

In the past it has been considered necessary to make exceptional earning statements in order to get the money desired for extensions, but this is a different age, an enlightened age, and in order to get the public to invest they must know all the truth. One reason the public is not investing in utilities is that they are told nothing about the details of the public utility business and fear other cases like the New York, New Haven & Hartford. In order to get the public to invest in our business, it is therefore necessary that we educate them to the stability of our business. And statistics show that no class of business is so stable, so reliable, so little effected by panics, as that of the public utility business.

Status of Watered Stock.

There are various kinds of "watered stock" and where no consideration in any form has been received, it is certainly not just to exact from the public, money to pay interest on such stock. There is one class of "watered stock" though, the value of which is not understood by the public. We refer to stock given as a bonus with bonds. For many years, in fact until the introduction of regulation by commissions, it was often the practice to raise the money for construction purposes by the issuance of bonds with a certain amount of stock given free with each bond. Many honest investors put their money into utilities, paying par for five per cent bonds with one hundred per cent stock bonus, at a time when money was worth seven per cent, eight per cent, or even more. Much of this was invested during the infancy of the electric art and the investment was highly hazardous. In other words, at a time when conservative, cautious investors were getting six and seven per cent with safety, these other men were risking their money in a hazardous undertaking. If their investment had been a loss, the public would not have recompensated them. Likewise, since their undertaking has been a success, they should be allowed to earn considerable more than ordinary interest. In the case cited of paying par for a five per cent bond with one hundred per cent stock bonus, since the bond pays a fixed interest of five per cent, sufficient interest should be allowed on the bonus stock "watered stock" so as to allow at least eight per cent on the total investment. If this is done the public is not being called upon to pay more than if the utility was paying eight per cent on stock sold at par. In regard to the amortization of his investment by the time of the end of the franchise, that, of course, should be figured, in this case, on his bond investment and interest only figured on his bonus "watered" stock. We do not mean to advocate the issuance of such bonus stock now, rather we are unequivocally opposed to it, but the early investors should be properly compensated for the risks they took during the early life of the industry.

Public Must Not Kill Incentive.

In order that public utilities may expand, serve new sections of growing communities and increase the service to present districts, it is necessary that sufficient capital be obtained, and no business requires as large amount of capital in proportion to gross business as the public utility business does. In order that communities may be served at as low a rate for electricity and gas as possible, it is necessary that the managements be given some incentive. As people invest in public utilities for profit, that incentive should be in the form of increased allowable net earnings in proportion to increased efficiency in the operation of their property. If this is not done, the natural result will be an unwillingness on the part of owners of public utilities to spend money in reducing expenses or increasing earnings if they are to be held to a fixed return on the money actually invested. Regulation that removes all incentive for developing and expanding on the part of the utility company, results in a community being poorly served and its growth retarded.

Regulating Commissions.

"But why bother and go to the expense of educating the public to all this? We have regulating bodies, commissions, who have, or will have, control in all such matters. It is only necessary when matters come to an issue to let them know all these things you have spoken of." Wrong again. A commission, such as a railroad commission, is a representative body and the public has simply delegated this control to them. Their term of office is short and their reappointment, or the character of the new appointees, ultimately depends absolutely on whether the public has been satisfied with their stewardship of this delegated power. Strong commissions may be leaders in forming public opinion, but in the last analysis they are but the representatives of the people and as such, when the people clearly state their wishes, it is their duty to abide by them.

Government Ownership.

Regulation is but a stepping stone to government ownership, and by government ownership we mean ownership either by the Federal government, state government or a subdivision thereof such as a municipality. My! But why fear? As a tenant we have simply received notice to get our house in order. We took the house subject to such a power on the part of the landlord, and the issue is not whether we should give up the house, but, rather, how to obtain just compensation for the expenditures, improvements we have made in it. Here again we must realize that the public will be the final judge of what that compensation will be. The fairness of the public in reimbursing us for moneys spent and improvements made will largely, if not entirely, depend on our thoroughly keeping the public informed of the heavy expenditures as they are made throughout our tenancy.

The Germ of the Policy.

The germ of our public policy should therefore be EDUCATION. EDUCATE the public to be frank and open with us, by being frank and open with them, EDUCATE the public to be fair with us, by first being fair with them. EDUCATE the public to sympathetically understand our difficulties, by first explaining what they are to them. Remember that the great accomplishments, especially in Germany, have been brought about by Education. Remember that public opinion is merely human opinion, and it is therefore not infallible, and subject to education.

Public utilities have performed wonderful engineering feats, but have been generally signally unsuccessful in wielding public opinion. But let us not be disheartened. Remember the saying of Confucius, "He is not strong who has never fallen, but rather he who having fallen has gotten up again."

Utilities are misjudged today but the same ability and perseverance that has built the wonderful dams, power houses and transmission lines should be able to correct this, and in the future the strength of a management will be largely measured by their ability to correct this misunderstanding.

Today, in general, utilities are giving good service, but these misunderstandings can only be eliminated by a system of EDUCATION.

DISCUSSION ON JONES' WATER POWER BILL.

The Bill Reviewed and Supported.

San Francisco, February 24, 1914.

Present regulations regarding the use of the public domain in water power development are most severely criticized for the revocable nature of the licenses granted, and for the annual tax imposed.

Although in both the regulations of the Department of the Interior and the Department of Agriculture it is conceded that the state and not the nation has control of water rights, still the annual tax is levied on the capacity of the plant.

The bill proposed by Senator Jones aims to cure this defect by fixing the annual rental at "a sum equal to five per centum upon the fair market value of such land as so determined by agreement or final adjudication." The bill, therefore, places the nation just where it should be—that is, in the same relation to the power project as is an individual or corporation owning lands which must be occupied. As in case of failure of agreement by the Secretary and grantee regarding the market value of the land the value must be fixed by the court, it is certain that the rentals to be paid will be very materially lower than those now exacted by regulation.

The bill gives the right to the grantee to occupy the land for a period of 50 years "and after the expiration of said period of 50 years such right shall continue until compensation has been made to the grantee for the fair value of its property as herein provided."

As provided in Section 4 of the bill, in case of taking at the end of 50 years, not only must the just market value of the entire plant be paid, but the public unit taking the plant must assume all contracts entered into by the grantee which have the approval of the proper public authorities. In case of failure of the parties to agree upon the purchase price for the plant the price is to be fixed by regular proceedings in a Federal court. The proposed tenure, therefore, is practically an indeterminate license.

From the standpoint of the public the bill provides all necessary protection. As stated in Section 3 "no value shall be claimed by or allowed to the grantee for the use of or the right to use the lands acquired under the term of this act" in case of taking over the property. Section 6 provides that rates and services shall be subject to lawful regulations by the respective states having jurisdiction, and by the United States in case of interstate business, or in extreme cases where the states or local authorities fail to exercise the right of regulation.

As the bill seems to meet the demands of all but the extremists among the so-called "conservationists" on the one hand, and those actually engaged in power development on the other hand, it is to be hoped that all interests will join forces in assisting in the passage of Senator Jones' measure.

Very truly yours,

(Signed) A. E. CHANDLER.

Suggested Amendments.

San Francisco, Cal., Feb. 24, 1914.

Development of water powers, essential to the needs of an advancing civilization, are necessarily made in advance of present needs, that actual needs may be supplied upon demand. The hazards incident to such investments, the long period of construction devoid of income, and the lean years usually following completion, entitle the developer to fair consideration by the public. Municipalities often consider a bonus paid to an industrial enterprise a good investment.

The benefits resulting from successful development of water powers which create new pay rolls, are distributed to the public, in which the builder is a unit. Results of adverse legislation or other artificial obstruction which shrinks or kills the payroll, are also shared by the general public. The aim of the government, therefore, should be to assist the builder if assistance be needed. Prospective pay for good work, and the satisfaction resulting from the accomplishment of a difficult task which creates and sets in motion new industrial wheels, are the builder's incentives to great undertakings.

The most important factor in any legitimate investment is its stability. There must be a substantial physicial, moral and legal foundation under any successful enterprises. Under existing laws, rules and regulations of the Federal government, this stability factor is practically eliminated under the legal status, owing to the uncertainty of tenure under revocable permits, and regulations which may be changed at any time in the discretion of the Secretary or his successor. This illogical situation, inconsistent with the proper conduct of business, must be changed to a rational basis if the West is to be further developed.

Believing "that government best which governs least," that "in all that the people can individually do as well for themselves government ought not to interfere," and that the nearer home public authority is exercised the better for all concerned, I think the development of water powers should be exclusively under state control, and the offices of the Secretary limited to granting rights of way as custodian of the public lands and not empowered to exercise any supervisory powers over developments by citizens or corporations. However, there are many who hold different views, and this bill seems in general a reasonable compromise. It eliminates much of the uncertainty under present laws, will materially aid in financing projects, and should satisfy the proponents of Federal control.

Section 2 of the bill makes the approval of the Secretary contingent upon his judgment of whether the proposed plans will promote the highest use of the water. This I think could be improved by making the approval of a grant contingent upon a showing that the grounds applied for would not be damaged beyond the power of the grantee to repair. The use of water is already under State jurisdiction. Provision should also be made allowing the grantee to perform sufficient work on the ground during negotiations with the Secretary to preserve the water right under the state laws.

Under Section 5, the grantee is required to complete and put in operation such part of the ultimate development within seven years as the Secretary may direct and complete the ultimate development under direction of the Secretary. As the state public utility commissions have jurisdiction with respect to extensions, improvements and betterments, and effectually protect consumers in the character of, and rates for service, conflicts in dual authority would likely arise resulting in confusion, delays and loss. These contingencies may be easily avoided by a slight change in the bill. The rights and duties of citizens in so far as is possible, should be explicitly defined by law, and not left to individual opinion. I beg to suggest for consideration the following in lieu of

Sec. 5. That in order to prevent tying up for speculative purposes, any of the lands to be acquired under this act, the grantee shall commence the construction of the project within two years from the date of the agreement, or in the event of failure to agree, then the date of final adjudication as to the value of the land to be occupied, and shall thereafter in good faith, continuously, and with due diligence prosecute such construction; and, for the purposes of this act, "due diligence" shall mean completion of the works, or operating units thereof in time to meet public necessities which will afford a reasonable market, and shall so continue such construction to the ultimate development of the project as may be economically justifiable to adequately supply reasonable market demands, and as may be ordered by the states public utility commissions.

This suggested change would remove one more possible uncertainty, and prevent conflict of authority.

Though the other important features of the bill providing for payment for use of land, sale of the plant, and indeterminate grant after 50 years are not entirely satisfactory from a developer's point of view, the bill as a whole, if made into law will greatly improve present conditions. It is a long step in the right direction. Any change that will substitute stability for uncertainty, confidence for suspicion, sound understanding in place of confused theories in a cloud of smoke, and start the water wheels humming, is the desideratum, and of much greater importance than the question of Federal or state control. The bill offers a good meeting ground for these contending factions.

Very truly yours,

(Signed) W. A. COOPER.

Would Oppose Proposed Water Power Legislation.

San Francisco, February 25, 1914.

I am opposed to the proposed measure because it does not provide for the development of water power by any agency save that of the "state, municipal subdivisions or public utility corporations." It leaves a construction as to the meaning of the act open to litigation upon the question whether a private development of waterpower would have to be made under the act of February 15, 1901, or whether it could be made at all. This would affect the rights of miners, irrigationists and others.

It upsets modern legislation passed by the states by taking from the authorities accustomed to pass upon the needs of a community, the settling of questions of fact and of expediency and places such power in the hands of the Federal courts.

It is not sufficiently definite as to the basis upon which the 'fair market value" of the land is to be decided. If it is to be decided with a view to the present value of the land as real estate, simply, the measure will meet with great opposition from the administration and the conservation element of the public. If it is to be based upon the value of the land for its power site, opposition will probably be made by the public utility seeking to acquire the right to use the land

The provision to allow Congress to declare a right forfeited at the end of fifty years is bad. It will promote lobbying at Washington and may result in the right granted being turned into a perpetual franchise. The term granted by the proposed act, is in substance, a limited or indeterminate franchise; but if there were no agency ready and willing to take over the properties of the present public utility possessing the same, at the end of the fifty years, conditions might be such that this franchise might become perpetual. It might be so that the contracts entered into by the corporation might have been very unfair at the time the agency designated by Congress to take over the rights of such corporation shall accept them and if no agency can be found to take over the property and contracts of the original user he would hold them forever. It would tend to encourage a corporation to manage its affairs in such a way that none other save itself could afford to operate the plant.

The provision for placing the valuation of the properties so to be turned over to the agency designated by Congress is bad because it also ultimately forces the applicant and the federal departments into litigation. The laws of the state of Wisconsin and of other states having modern laws regulating public utilities provide that such valuation shall be made by the railroad commission.

The most objectionable of the features of the proposed measure is contained in section five. This section provides a method for the prevention of speculation in water rights and in the lands to be acquired under the act. It, however, fails absolutely to accomplish such purpose. The laws of the state of California relative to water power use, provide that when a permit is granted by the state to use water for power purposes, actual construction work shall begin within six months from the date of the permit. The proposed measure says that such work shall be commenced within two years from the date of the final adjudication of the value of the land to be used for the power development. Therefore an applicant for the use of water for power purposes might get a permit from the state commission requiring him to commence work on the project in six months. He would then get the right from the Federal government, after probable litigation covering several years in the courts, to commence the construction of the project within two years, from the date of the determination as to the value of the land. In the meantime the state commission may revoke his permit because actual construction work has not commenced in the time allowed by law. Or, on the other hand, the Federal courts, or the state courts, in case of appeal to them from the action of the state commission, may decide that he was prevented from so commencing such construction work by reason of the litigation. This might be done on the ground that he was using due diligence to comply with the state law and was prevented from so doing by reason of such litigation If a "promoter" was so disposed, he could tie up that particular piece of land and the water dependent upon the use of such land, for an indefinite period of time, or until he could dispose of his rights therein to some bona fide developer. In case he so disposed of his rights the real development would be at the added expense caused by the necessity for paying off this "promoter" in order to get him out of the way. The rate at which the real promoter might dispose of the commodity produced by the "plant" would have to be increased because of this added cost of acquiring such rights.

The provision requiring an appeal to the president in case of the necessity for an extension of time in which to complete any one unit of the construction puts an additional burden on the prospective utilization of lands in this state. It is an unnecessary provision as the authority having in charge the use of such land would be the real agency deciding such matters as they would be referred by the president to the officer having jurisdiction over the lands in question.

The proposed measure as a whole is not comprehensive enough in its provisions. It leaves too many questions to the courts for settlement and instead of simplifying the procedure of gaining rights to develop water power sites, tends to multiply the already great difficulties in the way of the bona fide development thereof. It leaves the terms of the proposed act open to misunderstanding is ambiguous in its meaning and tends to promote litigation. Litigation is tedious and expensive. Nothing will so discourage the development of the water resources of this country as the necessity of going into court every time any difference comes up. It is a matter of record and of public knowledge that certain litigation over water rates started in the courts of San Francisco county in 1901, 1902 and 1903 have not yet been decided. All litigation is long drawn out and tedious owing to the overcrowded condition of the courts, both state and Federal; but water litigation is doubly so on account of the many angles such litigation may develop. These matters of water rights are best settled by a commission than by a court. Commissions are not bound by the technicalities with which the procedure in courts is surrounded. They are not bound by precedents established years ago and which do not fit present conditions. They can give more ready and equitable relief than can any court in the country.

I am also opposed to the passage of any measure that has not been drawn with a thorough knowledge of the subject of such legislation. Too many relief measures touching the use of water have been passed without affording any relief.

A careful study should be made of the needs of the various states of the Union before final legislation is proposed. Such legislation should be so comprehensive that all former legislation on the subject could be repealed by the later act. This would avoid conflict in the laws and the necessity for litigating every question that might arise. An effort should be made by any new legislation to reduce the number of agencies to which the intending applicant for water power would have to apply. At present there are at least three different bureaus to apply to and a possible fourth. I refer to the state water commission, the state railroad commission, the Federal forest service and the Federal interior department. Any one of these bureaus may fail to see the necessity for granting a right asked for. The applicant has been put to the expense of securing data and surveys and the services, in many instances, of an attorney. If he loses out he has had all of the outlay for nothing.

A plan, which is not without merit, was suggested to me some time ago for the solution of this problem of procedure. It was to have the state through the railroad commission handle the whole matter of applications for water rights and rights of way upon the public lands. When an applicant applied for such a right, the state would investigate the matter, and, if found feasible and in good faith, the state would apply to the Federal authorities for a lease of the power site at a nominal rental. The state would then give a permit for the use of the water and a lease for the use of the land. All revenue acquired from such use would be paid into the state or county treasury. In that way the state would ultimately gain the use of the lands within its boundaries. The treasury of the state or county, as the case might be would be enriched by the receipt of moneys that have heretofore gone to the Federal treasury. The old cry of the counties against losing the money that might otherwise come to it if it had the use of the lands withdrawn by the Federal government would be, in a measure stilled and the way of the intending developer of water power made smoother and such development encouraged.

In conclusion I will say that I cannot see that any particular benefit will accrue to the Western states through the passage of the Jones measure, nor do I believe such a measure will work out satisfactorily. On the contrary, for reasons herein stated, I believe it would tend to throw the whole subject of water development into worse confusion than it is at present.

The within expressed views are merely the expression of my own personal ideas gathered from ten years' familiarity with matters relating to the natural resources of the United States.

Very truly yours,

(Signed) HORACE TILLARD JONES.

Thinks Favorably of the New Water Power Bill.

San Francisco, Feb. 26, 1914.

Having had long and close contact with the subject of the development of hydroelectric power on the public lands and much dealing with the Federal government in acquiring rights of way, the Jones bill reads as if it were written as a result of these experiences.

The method of adjudicating the basis of value upon which to fix the charge of rental is fair and just, and has the advantage of being clear of any chance of a dispute.

The amount of the charge should be as little as possible as it is chargeable to the consumer, but also should be enough to compensate the government for the cost of administration of the lease.

The lands occupied would be leased for a term of years with the right of continuance or purchase at the date value by the government which is fair to both.

It meets the conditions of exempting from double regulation in states where regulation is now, or will be done by public service commissions and this will mean all of them before long.

It provides a workable way out of that most difficult problem, that of installing to meet demand without doing so at a needless interest expense on plant not immediately needed.

This difficulty is great and varies with the growth of communities.

It recognizes the tendency toward the ownership of works by the general public through state and municipal ownership which places all on a parity with privately owned public service. Section 9 is the clearest definition of the difference between "good" and "bad" trusts that I have yet seen, and this clause, modified to suit, would cover the subject of trust control and do away with the useless and harmful badgering of big business that until quite recently has been so popular with the trust busters.

If the finances and financial methods of a trust are under control, and the price at which a commodity is to be delivered to the consumer is regulated the size of the production plant need be limited only by the size it must be to be most efficient.

The public can be best, and most cheaply served by a single public service concern in each line in each community. All rival plants in the same territory should be consolidated for efficiency of operation. The need of competitive regulation has been removed when the service is commission regulated.

When public service is commission regulated it is impossible for it to be operated in restraint of trade.

Competition should be discouraged because it is wasteful and inefficient as a regulating device.

Public service should be commission regulated because it tends towards efficiency and economy.

Very truly yours,

(Signed) JOHN S. EASTWOOD.

Opposing View of the Jones Bill.

San Francisco, Feb. 27, 1914.

The trouble with the Jones bill (Senate 4415) is that it ought not to be. The good that its enactment might do is little and fleeting; the ill that its enactment could do is great and lasting.

The provision (Sec. 2) for the making of the fair market value of the public land occupied by the hydroelectric power works the basis of a 5 per cent rent charge to be paid the United States for the use, is good, in that it is a recognition by Congress of a commercial rule of business which had already been made law by the supreme court decision in the Minnesota Railroad Rate case. It is a promise of common honesty from the government in its future dealing with the people, where its present dealing, persisting despite the supreme court ruling, is dishonest. The Interior Department still collects rent from hydroelectric power users of public land estimated on the electric power output produced from the Heaven given water flowing over it; practicing in its hydroelectric power business regulation the maxim of the elder Huntington, "Charge all the traffic will bear," which the Commerce Department abhors and repudiates in railroad business regulation.

The provision (Sec. 3) that rent payments for the use of the public land shall not be capitalized and made the basis of an income earning, is good. True; no hydroelectric power user of the public land had ever done it, nor any efficiency engineer proposed doing it, but there's no telling but that some future captain of chain-bound industry might think of doing it, unless a United States senator thought of it first and nailed it down.

The provision (Sec. 8) that all water power reserves may be opened by the president to settlement and disposal, is good, if may in this bill has the force of must. There never was, nor is, the wisdom that a titmouse's brain might conserve, embodied in the making of so-called water power re-

serves of the public land. The reservation in patents hereafter issued, of rights of way for water uses which, though now and at the date of patent issue are and may be undefined, is good—if it be law which Congress may make. The principle under it was law in Mexican territory when Texas seceded and when the Treaty of Guadaloupe Hidalgo was ratified, and it may still be law in Mexico. It was law in the state of California, being adapted from the earlier Mexican law in the land, prior to the enactment of the civil code in 1872. (See Act. App. May 15, 1854; and Act App. April 28, 1860.) The point of the reference being, that this provision of the Jones bill is a matter within the states' legislative jurisdiction, and not within the jurisdiction of Congress, therefore the enactment of Congress cannot make it law.

The provision (Sec. 1) limiting the grants of rights of way to municipal and public service corporations, is bad. Why must similar grants of rights of way on the public land be denied to private persons for private uses of hydroelectric power or water? Why has not a farmer, a miner, a manufacturer, just as good a right to own a hydroelectric power plant for his private use, as he has to buy hydroelectric power from a public service corporation? Why this preference in the law for corporations and implied prejudice against persons? Are popular rights only for corporations?

The provision (Sec. 2) granting rights of way on Indian reservations, is bad, because it is bad faith, to say the very least of it. The Indian reservations are owned by the Indians, who in California, Nevada, Utah, Arizona and in part of Wyoming, Colorado and New Mexico, are full citizens; and who, in other states, are wards of the United States. By what right, other than the might of superior brute force, does the Federal government assume to grant land of citizen Indians, and presume to grant land of Indian wards? If Indian citizens' land can be taken by authority of act of Congress and granted or let, why may not your land and my land be taken by virtue, or at any rate under, the same authority. If the fifth amendment to the constitution is to be futile to protect Indian citizens and Indian wards from despoilation by the Federal government, may it not also be futile to protect you and I from being despoiled of our land by a despot in power at Washington?

The provision (Sec. 2) excluding national parks and monuments (which are merely lesser parks) from the public lands over which rights of way may be granted, is bad. Except Yellowstone Park and some other lesser parks excluded from cessions of jurisdiction on the admission of new states, the National parks are state territory, just as is other public land. Why the rule of tweedle-dee for some public land, and why the rule of tweedle-dum for some other public land? Does Jones know why? His reason "why" ought to be in his bill. It is nowhere else.

The provision (Sec. 2) requiring a filing of maps, plans and specifications of the hydroelectric power or other waterworks, needing rights of way on the public land, with the Secretary of the Interior, is bad. It loads a useless and economically needless preliminary expenditure on these enterprises of anywhere from $5000 to $25,000. Before such laws were made no one thought of expending investment money for maps and plans of the character demanded by this bill. People built the waterworks first, and maybe they mapped them afterwards and maybe they didn't. It did not matter because they ran just the same either way. Now it has been made to matter—and to cost—likewise to waste time in getting official approvals, which, consting money, contribute to raise the cost of hydroelectric power and water to the users. The bill, in this matter, would make an acute complaint of this business, become its chronic state.

The provision (Sec. 6) that the United States reserves the right to regulate rates or charges for hydroelectric power or water uses and services where the state does not, is vicious. When a citizen of a state may not in his courts question the exercise of the legislature's discretion on any matter, this bill purports to let the United States (that is to say, let some clerk of the president) question the state legislature's discretion outside of any power of review anywhere. The authority of Great Britain's Parliament was spurned by the people of her American Colonies for less than this.

In conclusion, the trouble of the Jones bill that it should not be, is because it is predicated on the assumption of a jurisdiction of Congress which has no constitutional existence. It assumes that the Federal government has a sovereign's right of uses in the public land by which it may let or hire out the land as proposed by this bill, whereas the Federal government holds in trust, only the proprietor's title of the fee of the naked soil; the People—the individuals of the people—being the sovereign, and thus possessed of the sovereign's rights of uses. The Federal government has only the right of the naked soil—and that a title in trust for disposal. The recent dicision of the California Supreme Court in the Tide Land Cases (L. A. No. 3060) lucidly explains this title of the Federal government to the naked soil. The proposition of the Jones bill requires that the doctrine in the English law of uses vested in the sovereign head of the state, should have force to give the Federal government the crown rights of uses of the public land. But, it could only do this on the assumption that the Federal government was the head of our people—their sovereign—whereas it is the people themselves who are the head of our states. The people have vested in themselves inalienably the rights of uses of the public land to take or leave as they individually like. The federal officers who assume as agents of our government to parcel them out, for favor or money considerations, are in fact taking money from us through selling us that which is already our own—they are mere money changers in the temple of our liberties. Somewhere in this broad land there should be men big enough to throw them out.

(Signed) RUSSELL L DUNN.

ELECTRICITY AND MATTER.

A highly interesting lecture on "Electricity and Matter" was delivered by Dr. Henry S. Carhart, before a large and appreciative audience at the Pasadena Y. M. C. A. on the evening of February 19th, under the auspices of the Throop College Extension Course. The lecturer, who performed many striking experiments and showed numerous lantern slides, reviewed the work of Crookes, Hertz, Roentgen, Lodge, Currie and others who have contributed to our knowledge on discharges of electricity in high vacua. He explained the ionic theory, the effect of the discovery of radium on our conception of the constitution of matter and showed by means of slides, recent photographs taken by C. T. R. Wilson, of England, showing the tracks of electrons and alpha particles, which have now been definitely identified with the atom of helium. The paper will be reproduced in full in a future issue.

PUBLICATIONS RECEIVED.

"Steam Turbines for Electric Stations of Moderate Size," and "New Developments in Steam Turbine Engineering," booklets by Edwin D. Dreyfuss, are being distributed by Hunt, Mirk & Company, San Francisco.

Sixth Annual Report, Montana Board of Railway Commissioners for year ending November 30, 1913. The board is also ex-officio Public Service Commission of the state and all matters pertaining to the completed business of both departments are included. Copy of the report will be mailed free upon request.

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A Public Policy of Publicity

Much of the antagonistic attitude of the public, actual or artificial, has been the result of the failure of utilities to appreciate the necessity for saying, each to the other, sufficient for a mutual understanding, and the importance on their part, of being the first to speak. In this way, misrepresentation could have been counteracted in large degree.

That the public do not appreciate the inherent difficulties attending the operation of public utilities is due simply to the fact that they have not been told. And for the same reason, they do not appreciate fully the increased comfort enjoyed, the added facilities and greater conveniences consequent upon the operation of these same public utilities.

Similarly it could be pointed out to the public that invention and the consequent increased efficiency of production is a greater factor than regulation, in the reduction of rates.

Through an educational campaign of publicity the public could learn that they will be best served by allowing that corporation to earn the best dividends which provides the most complete service. This is the only basis for a "reasonable" rate of return.

It is the needed stimulus for invention and improvement, and without the promise of such reward, commission control, with all its insistence upon standards of service, efficient management and regulation of rates, will not further the interests of the public, but will rather operate in an opposite direction.

Public policy of public utilities is not therefore as important a question as the policy of the public toward the utility and the manner in which it may be cast in the right mold.

The general spirit and purpose of the utility, if it does not embody this central idea of educating the public, will prove inutile. This is true whether the utility is viewed in the light of partner, tenant, agent, or steward, and is even more so in those situations where a politically directed tendency, recognizing none of these relationships, would make of the utility a serf.

This is the tendency, too, of over-regulation, which fails to recognize the fundamental principles of the conduct of business, which, in order to be successful, must be predicated upon freedom, confidence, and a reward of endeavor commensurate to the service rendered.

The public have some tangible property in progress which it is, therefore, to their interest to stimulate, but they can only learn this to the extent that the facts are presented to them to take the place of erroneous inferences.

The education of the public, which might be termed a policy of publicity, is the theme of an article in this issue on the public policy of public utility corporations, in which the author, Mr. S. Waldo Coleman, deals with this subject in more detail.

This article inaugurates what will now be a regular department. In articles already published the situation has been so clearly stated and is now so generally accepted, that the space will from now on be devoted to remedial possibilities and effective policies.

Your Viewpoint Appreciated

From the surface of the placid pool was reflected a landscape more beautiful and more extensive than the eye could then compass of the greensward, hills and trees it mirrored. By becoming sources because of the light received and reflected by them, they were, with the aid of the pool, in turn brought to the attention of the observer, to their appreciation—otherwise not bestowed—and to his advantage.

In this issue are several letters, not necessarily published because the Journal agrees with the reader's views, for opposite ideas are expressed, but because they reflect light from different angles, upon the important subjects discussed.

The Journal is in large degree a pool of other men's minds, and it is used for reflecting the different views and viewpoints of the hydroelectric and other power and gas interests of the West.

And just as the rays falling upon an object are diffused in every direction, so light on the questions reflected from these pages may be observed from all angles, giving an equally clear and comprehensive view from each.

If we are able to reflect again the thoughts arising in the mind of the reader, our object will be furthered.

Conservation Legislation

Neither battledores or battle doers have been lacking to keep the shuttlecock of conservation legislation in the air. It was without surprise, therefore, that a despatch was received from Washington close on the heels of the waterpower bill introduced by Senator Jones, announcing what is purported to be a new conservation policy fathered by Secretary of War Garrison, and dealing with navigable streams. It looks as though an effort is now to be made that this problem be worked out by closer co-operation between the states and federal government.

As with big business, so with waterpower developers. Both are desirous of knowing just what it is necessary for them to do in order to comply with the law.

Immediate action on this question is therefore essential that the interwoven mesh of state and federal laws, and opinions, regarding waterpower development be disentangled. But the action taken should be comprehensive, covering all possible waterpower development, and at the same time protecting established interests. Only in this way can be set free the energy of the capital and brains which would more fully utilize these resources.

Suits and more suits instituted by the government charge the air as a menace to hydroelectric enterprise.

The avowed object of conservation is not to hamper, but to aid. The law should, therefore, clearly define its requirements and development enterprise should be in this way adequately protected.

In the meantime, the different waterpower measures proposed call for the active interest of all. But the day of remedial measures of temporary relief have passed. The facts which may be made available call urgently for complete disposition.

Letters from readers in this issue show somewhat the difference of opinion which exists regarding these matters, and call for careful consideration.

With the administration active and apparently anxious for the satisfactory disposal of this question, the hour is ripe for the arrangement of a Western conference with the avowed intention of framing a waterpower bill to be submitted to Congress, representing the collective opinion of the West. It is primarily the West's problem and the West should handle it.

Western Red Cedar Poles

There are several reasons why the specifications for red cedar poles are published in this issue. As data on which to base specifications for the purchase of poles, or line construction contracts, they will be found of value. An effort is now being made to have the National Electric Light Association include these in their standard specifications for overhead line construction.

The specifications proposed for adoption are those of an association interested in the sale of poles and for this reason may not entirely agree with those specifications preferred by purchasers.

At the convention of the National Electric Light Association held at New York in 1911, specifications for overhead line construction were recommended to the executive committee of the association and were later adopted. These specifications have, as far as local legal requirements will permit, become standard, and are usually adopted by member companies without question.

Although Eastern white cedar pole specifications are included, Western red cedar is not mentioned. This, though undoubtedly unintentional, works an injustice to an extensive Western industry, and it is important that steps be taken that this be remedied.

It is not sufficient to endeavor to adapt the Eastern specifications to the Western product. Western red cedar does not taper as rapidly, for example, and the butt specifications given for Eastern white cedar would be impossible of application. The clause relating to one complete twist for every twenty feet is also here unnecessary, as the Western red cedar grows in sheltered flats and canyons, with the result that there are no wind-twisted trees.

There is no reason why such specifications should be involved, provided that all possible defects are covered and the purchaser thereby protected.

The committee of the National Electric Light Association entrusted with framing the overhead line specifications did not present them as perfect. It was anticipated that they would be improved and certain additions have since been made.

There appears to be no reason, then, why the specifications published in this issue should not be also included in the N. E. L. A. specifications.

Here is an opportunity for Western members to get action and so show that their outlook is not limited to their own interests except perhaps as they are identified with the larger interests of all Western industry.

PERSONALS

ITEMS FOR THIS DEPARTMENT ARE SOLICITED FROM ALL READERS

W. R. Lyall, of the D. & W. Fuse Company, is at Vancouver, B. C.

G. Douglas Jones, state electrical engineer, was at San Francisco this week from Sacramento.

C. H. Thordarson of the Thordarson Electric Manufacturing Company, is at San Francisco.

F. N. Averill, of the Fobes Supply Company, Portland, Oregon, is a visitor at San Francisco.

H. A. Kluegel, chief engineer, Mt. Whitney Power & Electric Company, was at San Francisco this week.

A. H. Noyes, salesman in the Pacific Nortwest territory of the Electric Appliance Company, is at San Francisco.

Geo. Richardson is now chief operator of the Southern California Edison Company's No. 7 substation at Los Angeles.

Sylvester A. Baker, Pacific Coast representative, Macbeth, Evans Glass Company, is now at Spokane, Washington, on business.

H. E. Sanderson, manager of the Pacific Coast offices of the Bryant Electric Company, has returned to San Francisco from Seattle.

H. B. Kirkland, general sales manager, American Conduit Manufacturing Company, Pittsburg, Pa., is among the Eastern visitors at Los Angeles.

J. I. Colwell, manager Seatle office, Western Electric Company, is at San Francisco and will attend the convention of the Pacific Coast Jobbers at Del Monte.

L. V. Cummings, chief engineer, Thorndyke Bley Mining Company, Sunland, Nevada, is at San Francisco making purchases of machinery and electrical equipment.

H. D. Harvey, who has been traveling the Nevada territory for the Electric Appliance Company, has now joined the city sales force of that company at San Francisco.

Franklin T. Griffith, president Portland Railway, Light & Power Company, has returned to Portland, Oregon, from a trip made to New York in the interests of his company.

H. C. Goldrick, Pacific Coast manager, Kellogg Switchboard & Supply Company, left San Francisco last week for the Hawaiian Islands in the interests of his company.

F. E. Greenman, now power salesman in the Oakland District, Great Western Power Company, was previously connected with the H. M. Byllesby Company at Stockton, Cal.

P. E. Jacquet, until recently employed in the Los Angeles district office of the Southern California Edison Company, has accepted a position with the Pacific Telephone & Telegraph Company at San Francisco.

W. W. Low, president Electric Appliance Company, Chicago, Ill., expected in San Francisco about March 11th, has arranged to attend the Pacific Coast Jobbers' Convention at Del Monte.

D. H. Scranton, president of the American Electric Heater Company, who was at Los Angeles during the past week, will visit San Francisco after attending the Pacific Coast Jobbers' Convention at Del Monte.

L. L. Hunt, general sales manager, Commercial Electric Supply Company, St. Louis, has been making a combined business and pleasure trip on the Pacific Coast, is returning by way of Arizona and Colorado, stopping at interesting places en route.

R. H. Ballard, secretary and general manager, and **H. H. Trowbridge**, chief counsel, Southern California Edison Company, have returned to Los Angeles from Chicago, which trip was made to complete the necessary details for the delivery of bonds to the company's bankers.

J. E. Gale is now president of the British Columbia Association of Gas Engineers; **W. G. Campbell**, first vice-president; **R. W. Pine**, second vice-president; **F. H. Chappell**, Vancouver, B. C., secretary, and **W. Stark**, treasurer. The association is beginning its second year as an organization and has 84 members.

H. M. Jones, manager San Diego Consolidated Gas & Electric Company, is responsible for an advertising campaign to be made by H. M. Byllesby & Company in the interests of the San Diego Exposition. The company's newspaper advertising throughout the country will now carry the lines "San Diego, Exposition—All 1915—San Diego, California."

George H. Harris has been appointed general superintendent of the San Francisco-Oakland Terminal Railways, and **George H. Binkley**, chief engineer in charge of maintenance of way and structures. **Edward M. Boggs**, formerly assistant to the general manager, is made chief engineer of docks and wharves.

L. B. Cramer has been appointed electrical engineer of the San Francisco and Oakland Terminal Railways, with offices on the third floor, Syndicate Building, Oakland, Cal. Mr. Cramer has for the past four years been connected with the Oregon Electric Railway Company and the United Railroads, a subsidiary of the system, at Portland, Oregon.

C. J. Franklin, general superintendent of railways for the Portland Railway, Light & Power Company, has resigned from that position. For some time Mr. Franklin has contemplated the organization of an institution to furnish public utility companies an opportunity to employ expert service in all matters embracing operating problems, matters of construction, valuation and appraisals, projected railroads, arbitrations and rate situations, and will now engage in that profession. There is a great demand throughout the country for competent reviews of impending difficulties in the matter of operation and of service. The questions involved are largely technical and are matters which appeal directly to the owners of the properties.

Mr. Franklin will open offices in the Wilcox building, Portland, Oregon, and **H. M. Clark**, his private secretary, who has been with him since Mr. Franklin has been connected with the Portland Railway, Light & Power Company, will be associated with him.

The resignation of Mr. Franklin, which has been accepted with regrets by the management of his company, will take from the local field one of the most prominent operating officials on the Pacific Coast. He has been connected with the Portland Railway, Light & Power Company as its general superintendent for seven years. During this time he had charge of the entire operation of the railways of the company.

Previous to coming to Portland Mr. Franklin was for five years with Stone & Webster, and was located at Tacoma as general superintendent of the Tacoma Railway & Power Company and the Puget Sound Electric Railway Company, operating between Tacoma and Seattle. Mr. Franklin was brought to the Pacific Coast by Stone & Webster after he had served thirteen years with the Virginia Passenger & Power Company of Richmond, Va. He first became associated with the electric railway business in Richmond, Va., where, as a boy, he started at work in the shops. It was with this company that the first successful commercial introduction of the electric railway took place in this country, and Mr. Franklin grew up in its environments.

MEETING NOTICES.

Oregon Electrical Contractors' Association.

On the evening of February 23rd the Oregon Electrical Contractors' Association was addressed by A. C. McMicken, manager of the commercial department of the Portland, Railway, Light & Power Company. The meeting was held at the Portland Commercial Club.

San Francisco Electrical Development and Jovian League.

Tuesday, March 2d, was Jovian Day, the meeting being held, as usual, at Tait's. There was a sparse attendance, but this seemed to have a stimulating effect on those present. G. Arbogast told of business conditions at Los Angeles and of the activities of the Jovian Order there, and J. E. Colwell, of Seattle Jovian activities. F. H. Poss was chairman. Good humor prevailed, and the meeting was voted one of the best yet held.

Utah Electric Club.

At the regular luncheon held at the Commercial Club, Thursday, February 26th, J. E. Cosgriff, president of the Continental National Bank, Salt Lake City, discussed "The New Banking Law." Mr. Cosgriff declared that the enactment of the new currency measure and the income tax law will ultimately operate as a curb on the ambitions of the money kings in this country to amassing fortunes in such enormous proportions as have marked the rise of such men as Rockefeller, Carnegie, Morgan and others.

In clear and concise terms Mr. Cosgriff gave the members of the Electric Club a brief history of American banking institutions and compared them with those of European nations and pointed out how the new banking law will retain practically all of the advantages of the American decentrallized system of control and obtain practically all of the advantages of the European systems of centrallized control.

Pacific Section of the National Association of Electrical Inspectors.

This section has been organized and electrical contractors may now hope for the long desired standardization of common practice, at least in cities around San Francisco Bay. Organization was effected through the efforts of W. S. Hanbridge, secretary of the California State Electrical Contractors' Association, who arranged a noon hour meeting at the Hof Brau, San Francisco, at which eight members of several Inspection Bureaus were present. These included those elected as officers and B. C. Hill, supervisoral inspector, Oakland, Cal.; W. N. Reed, inspector, Board of Fire Underwriters of the Pacific Coast, San Francisco; W. A. Spencer, electrical superintendent, San Jose, Cal.; O. K. Jones and Mr. Kempton. The officers are C. W. Mitchell, president; Wm. G. Pennycook, vice-president; J. W. Carrell, secretary-treasurer. The address of the secretary is 55 Fulton street, San Francisco.

Seattle Jovian League.

The Seattle Jovians held their weekly luncheon at the Lincoln Hotel Friday, February 20th. Members present were much interested in a thirty minute talk by Professor Magnusson, Professor of Electricity at the University of Washington, on the merits and possibilities of the nitrogen filled lamp.

Again the following week the League met at the Hotel Lincoln Friday, February 27th, and thirty members present enjoyed a half hour talk by Elliott Higgins of the Detroit Electric Vehicle Company, on the development of the electric vehicle industry.

Alameda County Electrical Development League.

A representative gathering at the regular monthly meeting held at the Avenue Restaurant, Oakland, Cal., discussed the advantages of the League endorsing or guaranteeing the work of its members, and of advertising their names in the local newspapers and periodicals. Considerable progress was made, a committee appointed with power to take action and it is thought that some such scheme will be immediately put into effect.

D. Mosher of the new Electro-Alkaline plant at Oakland, was present and addressed the meeting. Upon request he described the products, and the range of business anticipated.

A paper on "Lighting for Profit" was then read by H. E. Grant. Upon motion duly seconded, the League requested that the paper be published in the Journal of Electricity, Power and Gas. G. B. Furniss was chairman of the meeting.

Los Angeles Section A. I. E. E.

On the evening of February 28th, many of the members of the Los Angeles Section of the A. I. E. E. journeyed to Pasadena to attend the monthly meeting which was held at the Throop College of Technology and was conducted by the Throop Students' Branch of the A. I. E. E. The meeting was opened by Chairman E. R. Northmore and after the transaction of routine business, resolutions on the death of Cecil A. Howell, superintendent of tests for the Southern California Edison Company, and Andrew W. Lindgren, electrical engineer of the Huntington Beach Utilities Company, were adopted by a rising vote. The meeting was then turned over to Chairman W. L. Newton of the Throop branch and after a few explanatory remarks by Prof. R. W. Sorenson on the aims of Throop College, the following thesis papers were read: "The Design of an Automobile Testing Plant," by H. P. Gerckens; "Experiments to Determine the Relation Between Mechanical and Magnetic Properties of Iron and Steel," by V. Morse; "Electric Equipment for Automobiles," by G. D. Young; "Experiments on Y and Delta Systems," by Walter L. Newton. The members were then shown through the splendidly equipped laboratories, classrooms and shops of the college by Dean Damon, Prof. Sorenson and others, and the students who read the above papers, explained the apparatus employed for their thesis work.

Jovial Electrical League of Southern California.

A large number of members and their friends attended the weekly luncheon at Christopher's on February 18th, to listen to a lecture on the Big Creek Power Development, by G. B. McLean of the Pacific Light & Power Company. The lecture, which was well illustrated by lantern slides, made from very recent photographs, covered every detail of power house, line and substation construction and equipment and gave the audience a clear idea of the magnitude of this important development and the obstacles which had to be surmounted.

On Wednesday, February 25th, eighty Jovians attended the luncheon, over which Jas. F. Rogan presided, and listened to a scholarly address on "Probation," by Hon. Paul J. McCormick, superior court judge. It was pointed out that while probation should not be recommended in the case of habitual or hardened criminals, it had, nevertheless, proved its worth, when judiciously administered, as it failed to accomplish its purpose in only five per cent of all cases on record in this state.

A resolution was passed urging the city council to appropriate funds to bring the city planning exhibit, now on tour through the country, to Los Angeles. A similar resolution, on motion of Geo. A. Damon, was sent to the council by the local section of the A. I. E. E. As other civic organizations have sent similar requests, a committee to further this movement has recently been formed and Chairman Colkitt has appointed Max Loewenthal to represent the Jovian League on this joint committee.

Under the guidance of the present officers the league in general is increasing, both in popularity and usefulness. The present officers are J. N. Colkitt, chairman; Thos. E. Burger, vice-chairman; J. G. Pomeroy and J. Harry Pieper, executive committee; K. E. Van Kuran, secretary-treasurer. Out of town visitors are always welcome to attend the weekly meetings.

INDUSTRIAL

INFORMATION FOR EXHIBITORS IN MACHINERY DEPARTMENT, P. P. I. E.

Free Space: There is no charge for exhibit space, but space occupied must be properly and economically utilized.

Transportation: Exhibits may be consigned directly to the space to be occupied, through the Exposition Terminal Railway Company, which will receive and transfer exhibits from the terminals of the transcontinental and steamship lines, making a charge of .15c per hundred pounds. A one-way freight charge will cover return of all exhibits over transcontinental lines to point of origin.

The Exposition Terminal Railway Company will provide at Chicago and other eastern points, warehouses to receive less than carload shipments that will be combined in carload lots and shipped direct to the Exposition, thereby securing carload rates.

Water: The Exposition will install a system of mains for furnishing water for domestic and drinking purposes within or under the Exposition's buildings and generally throughout the grounds.

All consumers must purchase water on a meter basis. The rate for water for ordinary domestic purposes will be 40 cents per thousand gallons, and rates are subject to a minimum charge.

Special rates will be given for water used for other than ordinary domestic purposes.

Electricity Lighting Service: In the Palace of Machinery the lighting will be served from 60-cycle, 3-phase mains with approximately 115 volts between conductors. Exhibit buildings will not be open at night nor Sundays.

General illumination of building will be cared for by Exposition Company.

Alternating Current Power Service: In the Palace of Machinery there will be available for power purposes, 60-cycle, single-phase and 3-phase current at approximately 230 volts.

Single-phase motors must not be over 1 h.p. in size if served at 115 volts nor over 5 h.p. if served at 230 volts.

Direct Current Power Service: Direct current at approximately 125 and 250 volts will be available in the Palace of Machinery.

Direct current will only be available during the hours that the Exposition buildings are open to the public. No direct current will be furnished for motors or apparatus of larger capacity than 25 h.p. and no motor larger than 2 h.p. will be served with 125 volt d.c., unless arranged for in advance under special contract. As the amount of direct current is limited exhibitors requiring same must request the amount they need as early as possible.

Special Rates: Exhibitors requiring electric service to operate moving machinery for exhibit purposes will be charged only for the energy used at the rate of 3 cents per kw.-hr.

Gas Meter Rates: The rates for gas supplied to consumer during each calendar month or fraction thereof, and as measured by the meter installed by the Exposition, will be as follows:

$1.00 per 1000 cu. ft. for the consumption in each month up to and including 50,000 cu. ft.

$0.80 per 1000 cu. ft. for the excess consumption in each month over 50,000 cu. ft.

The minimum bill per month will be as follows:

For installaticns having a	¾ in. meter	$2.50
" " "	1 in. meter	5.00
" " "	1¼ in. meter	7.50
" " "	1½ in. meter	10.00
" " "	2 in. meter	15.00

Steam Service: Steam service will be available in the Machinery Building during the hours that the building is open to the public. Saturated steam at a pressure of approximately 150 lb. per sq. in. will be furnished. Headers and mains for live steam, exhaust steam, drips and drains will be installed by the Exposition. Participants requiring steam must arrange for service in advance.

Steam will be sold to exhibitors at approximately actual cost to the Exposition Company. The rates will be fixed as soon as the various elements of cost have been determined.

Compressed Air Service: A limited amount of compressed air at 80 lb. per sq. in. will be available in the Palace of Machinery. Compressed air service must be arranged for in advance.

The consumer shall pay for compressed air service a monthly charge of $4.00 per. h.p. of maximum demand of his installation, and in addition thereto $0.15 per 1000 cu. ft. of free air consumed. One h.p. will be considered equivalent to 5.5 cu. ft. of free air used per minute.

Crane Service: The main bays of the Machinery Palace will be served by electric, overhead traveling cranes. Two 30 ton cranes will travel the center bay and one 20 ton in each of the outside bays.

Exhibitors may obtain crane service for erection purposes, if needed, at a moderate rate.

Exposition Service: Working exhibits that are able to furnish part of Exposition requirements will be compensated at regular rates.

Building Details: The floor of the building is designed to carry a load of 200 pounds per sq. ft. and consists of two-inch plank on joists carried by mud-sills. The machinery building is located on ground well adapted for foundations. There will be no line shafting in the building.

The clear head room, below rails of traveling crane, of the three central bays is 50 ft. The wing bays have a clear head room of 40 ft.

Adjacent to the main building is located the "Gas and Fuels" Building, in which will be placed operating exhibits of boilers, steam hammers, gas producers, and other appliances in operation which by reason of noise or for other causes should be excluded from the main building.

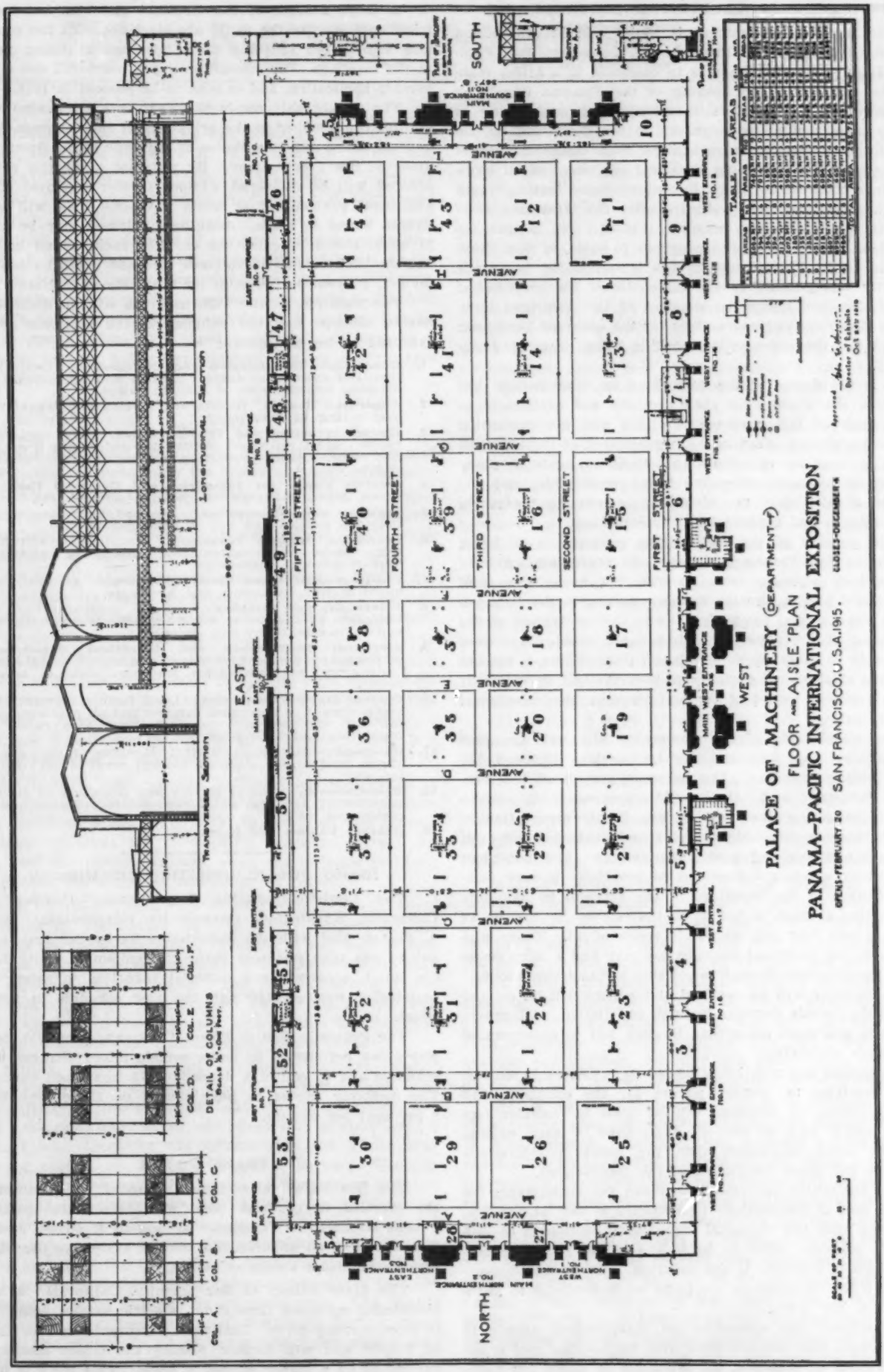
Space Application: Applications for exhibit space will be given precedence according to date of receipt.

At the present time it is only necessary for the applicant to state approximate amount of space desired. Detailed plans showing arrangements of exhibits can be sent in later when the final allotments of space are made

The official classification shows in which Palace the exhibit should be installed, and separate application is necessary for each exhibit department.

Combined Exhibits: Exhibitors who do not feel justified in the expense of independent exhibit, may collect their allotted space so that the expense of attendant or attendants may be proportioned among the different manufacturers. Each exhibitor must sign an application and his exhibit will be reviewed individually by the jury of awards. Further information on request.

The Palace of Machinery is the largest building erected on the Exposition site. It is 968 by 368 ft. One mile and a half of cornices were used in ornamenting the building. Four carloads of nails and fifteen hundred tons of steel (bolts and washers) were used in its construction. The numerous arched trusses supporting the lofty roof of this building are above the three longitudinal naves and have a span of 75 ft. placed above the three longitudinal naves and have a span of 75 ft


PALACE OF MACHINERY (DEPARTMENT-F)
FLOOR AND AISLE PLAN
PANAMA-PACIFIC INTERNATIONAL EXPOSITION
OPENS-FEBRUARY 20 SAN FRANCISCO, U.S.A. 1915. CLOSES-DECEMBER 4
EAST
WEST
NORTH
SOUTH
FIFTH STREET
FOURTH STREET
THIRD STREET
SECOND STREET
FIRST STREET
AVENUE
TABLE OF AREAS
LONGITUDINAL SECTION
TRANSVERSE SECTION
DETAIL OF COLUMNS

INTERNATIONAL ELECTRICAL CONGRESS, 1915.

The forthcoming congress is to be held in conjunction with the Panama-Pacific International Exposition, San Francisco 1915. This Exposition is to celebrate in a fitting manner the completion and opening of the Panama Canal. As this crowning achievement of science and engineering is certain to attract many engineers to the Canal and to the Exposition, it was early recognized that conditions would be propitious for convening electrical engineers of all countries in a congress in which the international feature would be unusually prominent. Accordingly, the American delegates to the most recent congress, that of Turin in 1911, extended an invitation to the congress to meet in San Francisco in 1915. This invitation was accepted, the necessary authority was granted by the International Electrotechnical Commission, and under the auspices of the American Institute of Electrical Engineers plans for the congress have been effected and the organization work is being prosecuted vigorously.

It is the desire of the committee on organization that engineers the world over shall promote and participate in the success of this congress. To that end the committee pledges its utmost effort in the organization of the congress and in making its valuable transactions available to members upon the most attractive terms practicable, and the committee calls upon the electrical engineering profession for assistance and support in its undertaking.

One purpose of the forthcoming congress is to bring together in San Francisco a large and representative body of electrical engineers from all over the world who shall find interest and inspiration in the congress, in the Panama-Pacific International Exposition and in the celebration of the completion of the American interoceanic canal. A second purpose is to erect in its published transactions a notable milestone of electrical engineering progress and development as a permanent record of contemperaneous electrotechnical achievement.

The membership of the memorable St. Louis congress in 1904 was over 2000 and the transactions included 150 papers with discussions. The immense growth of the electrical industry and the rapid progress of electrical science during the past decade justify expectation of a much larger membership and of greatly enlarged and even more authoritative and useful proceedings. The published transactions which are expected to constitute a very valuable addition to the literature of the art will be available to members at such a low price that either in part or as complete sets they will be within reach of all. Those who may be unable to attend the congress may find a large measure of participation through possession of the transactions.

Manuscripts will be received and papers will be printed in English, French, German, Spanish and Italian. All papers printed in languages other than English will be accompanied by English abstracts.

Invitations are now being issued to engineers in all civilized countries to prepare papers for the congress, and the committee on program will be glad to consider any papers which may be offered, acceptance of such papers, however, being contingent upon the usual considerations and upon the space limitations of the transactions.

The committee has chosen to make the membership fee and the cost of transactions to members as low as possible, depending upon the electrical engineering profession to support the congress generally by means of the large membership which is essential if the congress is to be self-supporting and if the transactions are to be made available to members at a low price.

Accordingly the committee on organization extends to all engineers who are affiliated with engineering and scientific societies of standing, an invitation to apply for membership in the International Electrical Congress.

A large number of the foremost and best known electrical engineers of the world are identified with the congress and many have signified their intention of being present at the meetings. The committee urges you to fill out a membership application, and to plan to be present in 1915.

The membership fee is $5 (New York Exchange) which entitles the member to the privileges of the congress, to the general index, and to a choice of any four of the Section Volumes of the Transactions. By payment of $1 the volumes ordered will be delivered without further expense. By an additional payment of 50 cents a volume they will be delivered bound in cloth. Additional volumes may be had at $1 each, bound in paper, or at $1.50 each, bound in cloth, and the entire set of 13 volumes (probably) will be delivered for $11, if bound in paper, or for $16 if bound in cloth.

The meetings of the 1915 congress will be divided into twelve sections and the volumes in the complete set are expected to be as follows:

1. **Generation, Transmission and Distribution.** Central station and substation design, control and operation. Long distance transmission of electric power.
2. **Apparatus Design.** Generators, motors and transformers. The rating of machinery.
3. **Electric Traction and Transportation.** City, surface and rapid transit railways; interurban and trunk lines; electric vehicles, ship propulsion, mining railways, elevators, and hoists.
4. **Electric Power for Industrial and Domestic Use.** Factories, mills, refrigeration, heating devices, etc.
5. **Lighting and Illumination.** Arc and incandescent lighting; the science and art of illumination.
6. **Protective Devices: Transients.** Switches, circuit breakers, condensers; electrostatics; disruptive phenomena; high-frequency phenomena.
7. **Electrochemistry and Electrometallurgy.** Electrolytic and metallurgical apparatus and processes.
8. **Telegraphy and Telephony.** (a) All communication of intelligence by the use of wires. (b) Electromagnetic waves and radio-telegraphy and -telephony.
9. **Electrical Instruments and Electrical Measurements.** Switchboard, portable, standard and absolute instruments. Testing and standardization methods; absolute measurements.
10. **Central Station Economics.** Load factors, power factors, measurement of maximum demand and all problems affecting the economy of central stations; also rates, their regulation and legislation.
11. **Electrophysics.** Radioactivity; Rontgen rays; gas and vapor conduction; electron theory; constitution of matter, etc.
12. **Miscellaneous.** Such as history and literature of electrical engineering symbols and nomenclature; engineering education and ethics.
13. **General Volume and Index.**

IDAHO PUBLIC UTILITIES COMMISSION.

The Lewiston-Clarkston Improvement Company of Clarkston, Washington, through its vice-president, Robert A. Foster, filed with the commission its application to publish at less than statutory notice, a supplement to its Schedule No. 1, constituting a material reduction in rates. The permission was granted and the new schedule is now in effect.

The Pocatello Gas & Power Company, Pocatello, Idaho, was given permission to make certain minor changes in its schedule and to collect a deposit of $3 from each customer. The company agrees to pay interest on these deposits at 8 per cent per annum.

TRADE NOTES.

The San Rafael city council awarded the contract for the erection in concrete base of 97 electrolier posts on Fourth street from Tamalpais avenue to E street, and the installation of an underground conduit system to the Pacific Fire Extinguisher Company at $14,165.

The State Prison at San Quentin, California, is being electrically equipped throughout, electric motors being used to replace group drive. This work represents an expenditure of $25,000 and will include placing the entire mechanical equipment on a higher efficiency basis. This work is under the direction of G. Douglas Jones, state electrical engineer.

NEWS NOTES

INCORPORATIONS.

MODESTO, CAL.—Oakdale Gas Company, $75,000, shares $1 each, subscribed $50, by J. R., M. M. and G. W. Anderson.

MEADOWDALE, WASH.—Sound Telephone & Telegraph Company, $5000, incorporated by W. P. and J. R. Cleaveland and Louis Andrews.

GLOBE, ARIZ.—Articles of incorporation have been filed by Hes. B. Ryan, Chas. W. Gift Jr. and Richard West, for the Globe & Miami Traction Company, capitalized for $250,000. The general nature of the proposed business is to furnish, transmit and deliver sounds, signals, mail matter, freight, general merchandise, light, heat and power, to operate a telephone system, a telegraph system and an electric railway, etc.

ILLUMINATION.

WALKERVILLE, MONT.—The city council has accepted a new lighting contract with the Montana Power Company.

KLAMATH FALLS, ORE.—Plans are being developed here for a municipal power plant. Attention will be directed to the feasibility of developing power through the medium of the Keno ditch.

EUREKA, CAL.—Improvements are being planned for the Humboldt system of the Western States Gas & Electric Company, it being estimated that over $70,000 will be spent here during the next twelve months.

GLENDALE, CAL.—The electric light department of this city has announced a reduction in electric light rates effective March 1st. The new schedule will be: For the first 20 kw.-hr., 7 cents per kw.-hr.; for the next 14 kw.-hr., 6 cents, and 3 cents per kw.-hr. for all in excess. There is a monthly minimum of 50 cents.

RIVERSIDE, CAL.—Sealed bids will be received up to March 18th, by the Board of Supervisors, Riverside County, for a franchise granting the right to construct and operate a system of wires for transmitting electrical energy for light, heat and power purposes, along public roads in Riverside County, the franchise to run for 50 years.

LOS ANGELES, CAL.—Lower electric rates are promised consumers by the Pacific Light & Power Corporation and the Southern California Edison Company in applications filed with the State Railroad Commission for permission to take over certain southland plants. The Pacific Light & Power Corporation proposes to take over two plants at San Fernando, another at Compton, and still another at Glendora; the Southern California Edison one at San Fernando.

OGDEN, UTAH.—The city commissioners have reached a satisfactory agreement with the Utah Power & Light Company relative to the equipment and current necessary, and have authorized the Mayor and Recorder to enter into a contract with them for the extension of the White Way Lighting system on Twenty-fifth street between Washington and Adams avenue. The system as at present installed consists of the General Electric 4 amp. d.c. luminous inverted type arc lamp adapted to a decorative bracket mounted on the steel poles carrying the suspension wires for the trolley system of the Ogden Rapid Transit Company. P. M. Parry, manager of the lighting company announces that the arc lamps will be installed at an early date. The Weber Club have a committee appointed to work on further extension on this system to all of the principal business streets of Ogden.

TRANSMISSION.

SAN FRANCISCO, CAL.—For the first time since its completion, four years ago, the power lake of the San Joaquin Light & Power Company at Crane Valley is full, the water being at a record height of 106 ft.

NEWPORT, ORE.—The Newport electric light plant has been purchased from J. D. Hewitt of Tacoma, and Seymour H. Bell of Portland, by A. Welch, railroad builder and capitalist and promoter. A new engine and new boilers will be installed.

GLENDIVE, MONT.—The Glendive Heat, Light & Power Company has announced that a new hydroelectric power plant, representing an investment of $75,000 will be constructed next spring near the Yellowstone River. The building will be two stories high and will be built of concrete and brick.

SOUTH BEND, WASH.—Frank MacKean of Seattle has filed water appropriation rights on the South Fork River and has closed negotiations with owners of property along the river for the development of Willapa Harbor and South Bend. A big hydroelectric plant will be built, and when the deal is closed the company will control 2000 acres of land which will be placed at the disposal of colonists.

FRESNO, CAL.—For the purpose of insuring continuity of service the 241 mile aluminum transmission line between Big Creek and Los Angeles is being duplicated through the rough portion of the route. This additional line is to cover only the mountainous sections, as it is not figured that breaks are so likely to occur over the plains. The second line will be entirely separate, supported by its own steel towers, and will parallel the original line.

SALT LAKE CITY, UTAH.—The Utah Light & Railway Company are now engaged in installing a 1500 kw. motor-generator set at the West Temple Street substation for supplying 600 volt direct current to their railway system. This additional direct current transforming capacity has been made necessary by the addition of 24 new cars operating over the city system which supplies service on the interurban lines to Holliday and Bountiful recently put into operation.

ALBUQUERQUE, N. M.—Col. John Borradaile has presented to the city council a project of harnessing the waters of the Rio Grande at White Rock canyon for furnishing power for light and other purposes. The cost of construction of the power project is estimated at $400,000, and for an additional $400,000 the project could be made to include a water plant for Albuquerque. The J. G. White Engineering Corporation, construction engineers, will take up the project in a promotion capacity provided they are assured Albuquerque and tributary territory will subscribe to one-fourth of the stock of the company which they would organize.

SACRAMENTO, CAL.—Through an application to the state conservation commission, and by the statement of C. H. McKendree of Lakeview, Ore., a power project by harnessing the waters of Fall River in Shasta county is revealed. Incidentally the conservation commission will be called on to decide a novel point involving the disposition of power generated on a California waterway in the neighboring states of Oregon and Nevada. McKendree, who is connected with a Lakeview power concern, filed application for permission to divert a flow of 1500 cu. ft. of water per second, capable of generating 48,000 h.p. Fall River is a tributary of the Pitt, which, in turn, flows into the Sacramento. The surrounding country, including a large section of southeastern Oregon, is susceptible of irrigation, and the assumption

is that McKendree and his associates intend to engage in operations of the largest kind, furnishing power to sawmills, stock farms and irrigated farms.

LOS ANGELES, CAL.—As the result of the rejection of the city's proposition to the power corporations for the leasing of their distributing systems, with an option to purchase within five years, the council will probably call the power bond election at once. The corporations recently rejected the city's offer, and asked for further time to submit an alternative plan. Municipal ownership of the power systems is the rock upon which the negotiations were split. It was made apparent to the council committee that the corporations would not consent to the city's acquiring the power systems. Councilman Betkouski, chairman of the power committee, has announced that it is the committee's intention at once to introduce a report to the council recommending the calling of a bond election to vote $6,500,000 in bonds to complete the aqueduct power plant, and to acquire a distributing system. The next step will be to call upon the state railroad commission to condemn the distributing systems for the city's use.

TRANSPORTATION.

SEATTLE, WASH.—Actual work on the reconstruction of the Highland Park & Lake Burien Street Railway has been undertaken at the Seattle end of the line.

CHICO, CAL.—The Northern Electric Railway Company is preparing to move its auditor's office from this city to Sacramento.

PHOENIX, ARIZ.—The Phoenix Street Railway Company has made application for extension of its lines down East Washington street, a distance of about ¼ mile. Construction on the proposed line will begin immediately.

LOS ANGELES, CAL.—The Pacific Electric Company is contemplating building an interurban line into Riverside county, the line to leave the San Bernardino line at Fontana, reaching Riverside by way of Bloomington, covering a distance of four miles.

TACOMA, WASH.—Announcement has been made by officials of the Oregon-Washington Railway & Navigation Company that between five and six million dollars has been authorized by the directors of the Union Pacific system to be expended for improvements on the company's lines in Washington and Oregon.

SEATTLE, WASH.—The Puget Sound Traction, Light & Power Company has been granted permission to file a tariff showing sharp reductions in practically all freight rates between Seattle and Tacoma. This new tariff indicates that the interurban lines will enter into sharp competition with boats on Puget Sound for Seattle and Tacoma freight business.

SALT LAKE CITY, UTAH.—The Utah Light & Railway Company announces that it will extend its interurban line into Davis county from Centerville on to Farmington, a distance of five miles, during the coming year, and that ultimately the line will be continued through to Ogden. The completion of this line to Ogden will give the intervening territory in Davis and Salt Lake counties two steam lines and two interurban electric lines.

SACRAMENTO, CAL.—The Oakland, Antioch & Eastern Railway has made traffic arrangements with all the transcontinental roads which reach Sacramento. These arrangements, which go into effect on March 15, provide for an interchange of shipments between the Santa Fe, Union Pacific, Southern Pacific and Western Pacific and the O. A. & E. and through tariffs have been provided for such shipments to those points served exclusively by the electric road.

SAN FRANCISCO, CAL.—The total accumulated earnings of the Geary Street Municipal Railway now amount to $263,240. This is what the road has earned after paying all operating expenses since it first began business in December, 1912. There will be a large balance left after payment of other charges, such as interest and bond redemption. The total gross receipts to the end of January were $497,703. The total expenses were $234,462. The receipts for January amounted to $53,644 and the expenses $25,134.04. The Union street line since it same into possession of the city shows earnings just about half of the Geary street line.

SAN FRANCISCO, CAL.—Further consideration of the question of how best to relieve congested traffic conditions at the foot of Market street was taken by the supervisors a few days ago. The same arguments and suggestions made at the conference last week were again discussed, and at the conclusion of the debate the city was no nearer a solution of the problem than before. City Engineer O'Shaughnessy had modified his plans for an elevated loop, starting the incline in the center of Market street instead of at both curbs. He stated that his method of relief could be constructed at a cost of $300,000 and completed in seven months. J. J. Dwyer of the Harbor Commission declared the loop could not be constructed as speedily as the city engineer figured and that its cost, including damages to the Ferry building and Market street property would reach close to $1,000,000. The whole subject matter was finally left in the hands of the public utilities and streets committee of the supervisors.

SAN FRANCISCO, CAL.—The city engineer's office announces that the construction of the Municipal Railway on Van Ness avenue and Chestnut street will probably be started earlier than anticipated. The commencement of work on these two lines was set for April 15th, but as the materials have begun to arrive and the plans are ready, the intention now is to get bids for construction without delay, and it is expected that work will be under way before April 1st. A carload of track specials has arrived from the East, this being the first shipment under the contract, and will be unloaded at the city yard on Sixth and Hubbell streets. The first shipment of steel rails from the East is to arrive this week. At the yard there are already 11,000 redwood ties, a California product furnished under contract. The Van Ness avenue and Chestnut street lines will be among the chief means of transportation to the Exposition grounds, and the city engineer's office now believes that cars will be running on them in June.

TELEPHONE AND TELEGRAPH.

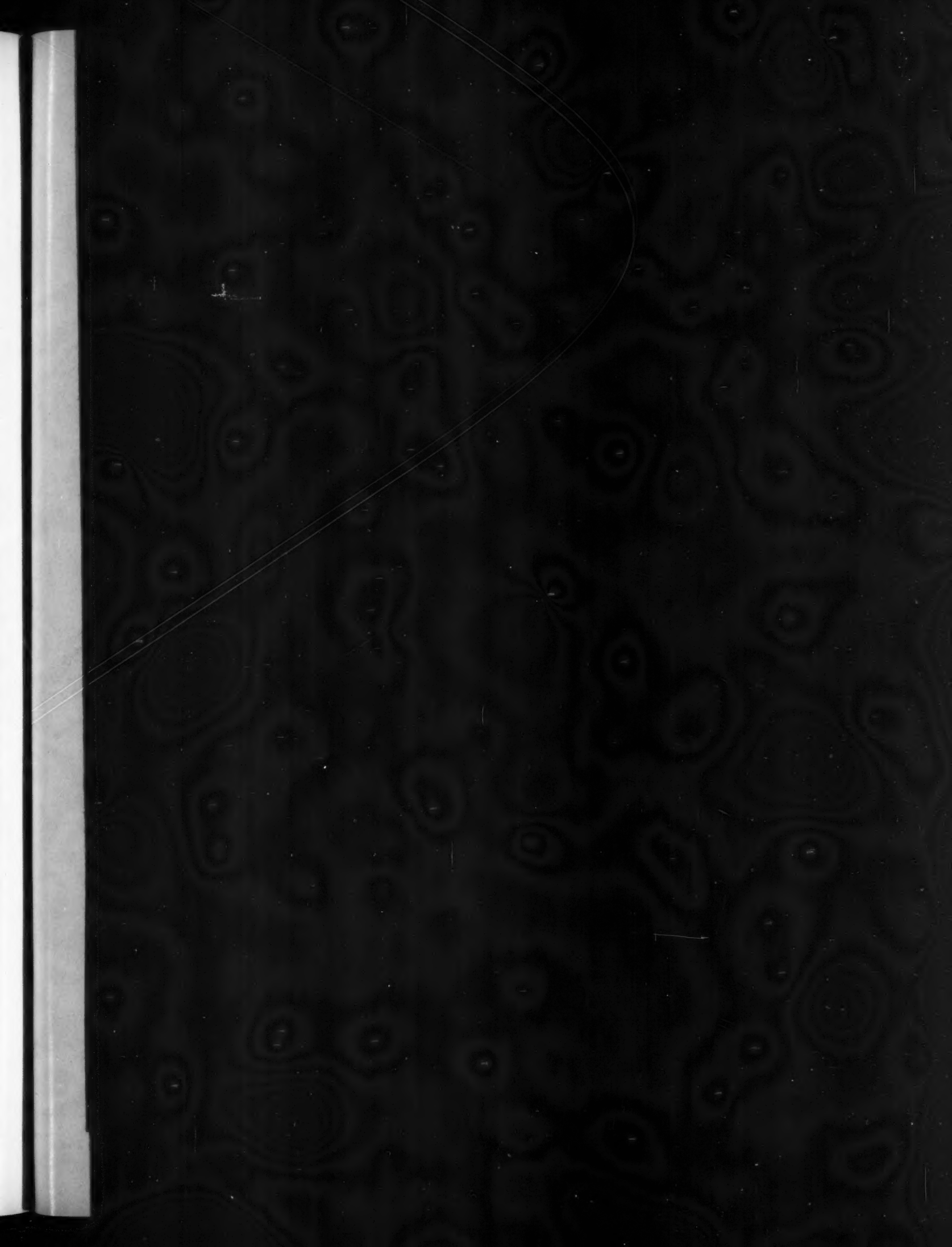
IMPERIAL, CAL.—The Imperial Telephone Company has been awarded the contract by the city trustees for the installation of a telephone fire alarm system.

BAY CITY, ORE.—At a meeting of the Nehalem Telephone & Telegraph Company held the first of the month, no definite action was taken, but it is generally conceded that Wheeler will soon have an independent line to meet up with Nehalem and other valley points.

WATERWORKS.

ORENCO, ORE.—At a recent election the people of this place decided to issue bonds for a municipal water system.

NORTH BEND, WASH.—An ordinance has been passed providing for condemning, purchasing and maintaining a system of waterworks for the town of Snoqualmie.

ALBUQUERQUE, N. M.—The city council has voted to discharge the citizens' water commission, and to drop all consideration of the city's water supply until after the April municipal election.

UMATILLA, ORE.—At the election held here February 16th bonds were voted in the sum of $20,000. The proceeds will be used for the construction of a water system for which plans and specifications have been submitted by Louis C. Kelsey.